TECHNICAL MEMORANDUM
JUNE 2000 GROUNDWATER MONITORING REPORT

AMERICAN CHEMICAL SERVICE SUPERFUND SITE
GRIFFITH, INDIANA

Montgomery Watson File No. 2090603

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EXECUTIVE SUMMARY

The long term groundwater monitoring plan at the American Chemical Service, Inc. (ACS) National Priorities List (NPL) Site in Griffith, Indiana, consists of semi-annual sampling of the 44 wells in the monitoring network. In addition, three of the monitoring wells, MW48, MW49, and MW9R are sampled on a quarterly basis and up to five private wells in the vicinity of the Site are sampled once each year. For one of the semi-annual sampling events, the monitoring well samples are analyzed for the full Target Compound List and Target Analyte List (TCL/TAL) parameters. For the other major sampling event, the samples are analyzed for a reduced list of indicator parameters. Each quarter, water levels are measured at all monitoring network points in a single 24-hour period.

This Technical Memorandum summarizes the June 2000 groundwater monitoring activities at the ACS NPL Site. The June event consisted of a minor sampling event, with the samples analyzed for indicator parameters at two upper aquifer and two lower aquifer monitoring wells. All samples and analyses were conducted in accordance with the September 1997 U. S. Environmental Protection Agency (U.S. EPA) approved sampling plan.

SITE HYDROGEOLOGY

The regional groundwater flow in the upper aquifer is from east to west in the vicinity of the ACS facility. At the ACS Site, the flow is diverted to the north and to the south by the barrier wall, installed as part of the ACS final remedy. The potentiometric surface to the northwest of the Site (including the wetland area) is relatively flat due to the effects of the Perimeter Groundwater Containment (PGCS) Trench, barrier wall, and discharge points from the groundwater treatment plant effluent. Depressed water levels in the Town of Griffith Landfill show evidence of the effect of their leachate collection system (LCS).

Horizontal groundwater flow in the lower aquifer is northward with a hydraulic gradient of 0.00044. This gradient is consistent with previous lower aquifer data presented in earlier groundwater technical memoranda.

Vertical gradients were calculated across three aquifer horizons: 1) the upper aquifer in the wetland area, 2) the upper and lower aquifers, and 3) the lower aquifer. All gradients were consistent with previous findings. Vertical gradients measured in the wetland area were very small and were generally upwards as in the past. Downward vertical gradients were measured between the upper and lower aquifer. Vertical gradients measured in the lower aquifer were small and variable. Of the calculated gradients in the lower aquifer, ten were downward, two were upward, and one was within the margin of potential error in water level measurement. Consistent vertical gradient trends are seen in three well nests in the lower aquifer: downward at MW52/MW53 and MW54R/MW55, and upward at MW9R/MW34. This variability indicates that there is not an overall trend in vertical gradient data in the lower aquifer.

EXECUTIVE SUMMARY

For discussion purposes, the upper aquifer flow system was divided into three regions for analysis: the North Area, South Area, and the Griffith Landfill. The North Area extends northward from the north end of the ACS facility near the On-Site Containment Area and west/northwest into the wetlands. The South Area extends southeasterly from the barrier wall at the southern end of the Off-Site Area.

Groundwater sampling within the shallow aquifer during the June 2000 event was limited to monitoring wells MW48 and MW49 in the North Area. Chloroethane and benzene continue to be detected in MW48 within the range of previous detections, but have been showing decreasing trends. Although usually detected in the groundwater sample from MW49, benzene and chloroethane were not detected in MW49 during June 2000. This may be due to seasonal fluctuation in water levels and concentrations in this area. Detection of VOCs and inorganics were compared to the maximum baseline concentrations for each well. There were no VOC or inorganic exceedances in June 2000 in samples from either of these wells.

Two lower aquifer wells, MW09R and MW10C, were sampled during June 2000. Detection of benzene and chloroethane in these wells is within the range of previous concentrations. Benzene concentrations in samples from MW09R continue to show decreasing trends since it replaced monitoring well MW09. Detections of VOCs and inorganics were compared to the maximum baseline concentration for each well. There were no VOC exceedances in either monitoring well, although the benzene concentration in MW10C matched the maximum baseline concentration for the well. There were also no exceedances for arsenic or lead in MW09R.

As in the past, a separate report will be submitted that includes a discussion and data evaluation for the groundwater treatment system effluent samples.

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1.0 INTRODUCTION

1.1 LONG TERM GROUNDWATER MONITORING PLAN

The long-term groundwater monitoring plan, approved by U.S. Environmental Protection Agency (U.S. EPA) in September 1997, for the American Chemical Service, Inc. (ACS) National Priorities List (NPL) Site in Griffith, Indiana, consists of two major (semi-annual) sampling events each year and two minor sampling events. The major sampling events consist of sample collection at the 44 monitoring wells in the monitoring network. For one of the major semi-annual events, the groundwater samples are analyzed for full scan Target Compound List and Target Analyte List (TCL/TAL) parameters. For the other major semi-annual event, the samples are analyzed for a reduced list of indicator parameters. The indicator parameters are tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (TCA), 1,1-dichloroethene (DCE), 1,2-dichloroethene (1,2-DCE), vinyl chloride (VC), chloroethane, benzene, arsenic, and lead.

The minor sampling events consist of sampling three monitoring wells within the monitoring network, which have shown variable contaminant concentrations during the baseline sampling. These include upper aquifer monitoring wells MW48 and MW49, and lower aquifer monitoring well MW09R. Samples from these monitoring wells are analyzed for indicator parameters. Monitoring well MW09R has been analyzed for full scan TCL/TAL compound list during the minor sampling events in the past, but during 1999 and 2000, it will be analyzed for the same compound list as monitoring wells MW48 and MW49, in accordance with the U.S. EPA Letter dated June 15, 1998.

During each of the four sampling events, water levels are collected from the full monitoring network prior to collecting groundwater samples. These measurements are conducted within a 24-hour period and used to construct hydraulic gradient maps and tables.

Once annually, samples are to be collected from up to five private wells and analyzed for the full scan TCL/TAL parameters. This private well sampling has generally been conducted concurrently with the third quarter groundwater monitoring event.

1.2 OBJECTIVES AND SCOPE OF JUNE 2000 SAMPLING

The June 2000 sampling event was one of the semi-annual minor events, with sample collection at three monitoring wells. In addition, one additional lower aquifer monitoring well, MW10C, was sampled for indicator volatile organic compounds (VOCs), because of baseline exceedances of benzene during the June 1999 and November 1999 sampling events.

The following objectives from the long-term groundwater monitoring plan apply to the quarterly sampling at the ACS NPL Site.

1. Collect water level data to monitor groundwater flow in the upper and lower aquifers and calculate the hydraulic gradients between the aquifers.

2. Collect water level data to document the performance of the Perimeter Groundwater Containment System (PGCS) and Barrier Wall Extraction System (BWES) and to evaluate changes in the groundwater flow system resulting from the remedial actions (these activities are outlined in the Performance Standard Verification Plan, April 1997). The Groundwater Treatment Plant Quarterly Monitoring Report is submitted under separate cover and includes information on this objective.

3. Collect and analyze groundwater samples from the interior of the areas of contaminated groundwater to document how concentrations change with time and in response to the remedial actions.

4. Assess progress toward attaining cleanup objectives in contaminated areas.

1.3 ORGANIZATION OF TECHNICAL MEMORANDUM

The results of the June 2000 groundwater monitoring activities at the ACS NPL Site are presented in the following sections of this report:

- Section 1 Objectives and scope of the groundwater monitoring activities
- Section 2 Field data collection activities
- Section 3 Evaluation of the June 2000 sampling data
- Section 4 Summary and Conclusions

Tables, figures and appendices are presented at the end of this report.

A baseline sampling report was completed following the September 1997 sampling event. That report included a long-term Groundwater Monitoring Plan. In accordance with the U.S. EPA-approved Groundwater Monitoring Plan, this Technical Memorandum compares the June 2000 groundwater analytical results to the highest detected concentrations observed for each well and parameter during the baseline sampling. This comparison table is found in Appendix A.

2.0 FIELD DATA COLLECTION ACTIVITIES - JUNE 2000

Field activities were conducted on June 26 and 27, 2000 at the ACS Site. The groundwater monitoring activities were conducted in accordance with the U.S. EPA-approved Specific Operating Procedures (SOPs), the Pre-Design Quality Assurance Project Plan (QAPP) submitted in August 1995, and U.S. EPA comments regarding the Pre-Design QAPP. All monitoring wells were purged and sampled using low-flow methods in accordance with the approved Monitoring Well Sampling Proposal and Protocol SOP for the Upper Aquifer Investigation (Revision: July 25, 1996). The June 2000 groundwater sampling event consisted of the following activities:

- Measurement of water levels in 130 upper and lower aquifer wells, piezometers, and staff gauges on June 26, 2000.
- Upper aquifer monitoring: collection of groundwater samples from two monitoring wells screened in the upper aquifer and analyses for indicator parameters; samples were collected on June 27, 2000.
- Lower aquifer monitoring: collection of a groundwater sample from monitoring well MW09R and analysis for indicator parameters, and collection of a groundwater sample from monitoring well MW10C and analysis of indicator VOCs; samples were collected on June 27, 2000.

2.1 WATER LEVELS

Water level measurements were collected at the majority of upper and lower aquifer wells, piezometers, and surface water staff gauges on June 26, 2000. The water level measurements were utilized to determine groundwater flow directions in the upper and lower aquifers, and to calculate vertical gradients both within and between the aquifers. Table 1 contains water level measurements, map coordinates (reference points), top of inside well casing elevations, and calculated groundwater elevations for the measurement points.

2.2 GROUNDWATER SAMPLING

Prior to sampling the monitoring wells, each well was purged using low-flow methods in accordance with the U.S. EPA approved Monitoring Well Sampling SOP of the Upper Aquifer Investigation (revision: March 21, 1997). Field parameters (pH, specific conductivity, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity) were measured and recorded during well purging activities. Table 2 presents a summary of the field parameter results.

The groundwater samples were sent overnight under chain-of-custody to CompuChem Laboratory, Cary, North Carolina, where they were analyzed for the parameters listed in Tables 3 and 4. The tables summarize well identification, well screen depth (lower aquifer only), well location, and monitoring parameters.

3.0 EVALUATION OF JUNE 2000 SAMPLING DATA

3.1 GROUNDWATER FLOW SYSTEM DATA

Water table and potentiometric surface maps were developed for the upper and lower aquifers and the overall horizontal hydraulic gradient was calculated for the lower aquifer. Vertical hydraulic gradients were calculated across three aquifer horizons: 1) within the upper aquifer in the wetland area, 2) within the lower aquifer, and 3) between the upper and lower aquifers. The following sections present and discuss the general flow directions in the upper and lower aquifers and the calculated gradients.

Vertical hydraulic gradients were calculated for both the upper and lower aquifers using water level measurement data from adjacent wells and piezometers screened at different depths within each aquifer.

3.1.1 Groundwater Flow in the Upper Aquifer

The upper aquifer matrix is homogeneous silty sand with no evidence of interlayering or bedding complexities. Many years of groundwater flow monitoring have shown that the natural regional groundwater flow in this aquifer is westward. The barrier wall, completed in 1997, has affected the groundwater flow by diverting it to the north-northwest and to the south-southeast.

Figure 1 presents the upper aquifer water table elevations from data collected on June 26, 2000. Due to the large number of data points (5 staff gauges, 22 wells, and 79 piezometers), little interpolation was required to develop detailed contour plots. Since the Remedial Investigation in 1991, all water table maps developed for the ACS Site have consistently shown the same general groundwater flow patterns. The gradient to the northwest of the site is relatively flat due to the affects of the PGCS trench, barrier wall, and discharge points from the groundwater treatment plant. Southwest of the Site, the water levels are depressed due to the effects of the Town of Griffith Landfill's leachate collection system. During June 2000, the effects of the PGCS are not obvious, as during other sampling events. This is possibly due to high water levels muting out these effects. South of the Site, near the landfill, a groundwater mound divides the groundwater flow north and south. This mound has historically been noticed, and seems more prominent during the summer months when water levels are higher.

3.1.2 Vertical Gradients in the Upper Aquifer

Table 5 shows the upper aquifer vertical gradient calculations based on the June 2000 water level measurements. These are shown in their historical context in the tabulation below:

Piezometer Nest	Dec 1997	June 1998	Sept 1998	Nov 1998	March 1999	June 1999	Sept 1999	Nov 1999	March 2000	June 2000
P64/P65	0.016	0.020	0.016	0.016	0.018	0.014	0.010	0.010	0.016	0.022
P66/P67	0.002	0.005	0.004	0.003	WU	0.006	-0.010	WU	0.002	0.007
P68/P69	0.007	0.003	0.005	WU	0.005	0.012	0.010	-0.008	0.003	0.013
P70/P71	0.037	0.023	0.057	0.073	0.040	0.042	0.055	0.058	0.037	0.035

Notes:
WU= Within uncertainty of measurement technique.
Negative value indicates downward gradient.

The vertical gradients in the upper aquifer were calculated by dividing the difference in head between nested piezometers by the vertical distance between screen midpoints. The vertical gradients are generally small and upward, which is the typical occurrence in a wetland area where groundwater discharges to the surface.

3.1.3 Groundwater Flow in the Lower Aquifer

The lower aquifer groundwater elevations listed in Table 1 were used to develop a potentiometric surface map for the lower aquifer (Figure 2). The groundwater flow in the lower aquifer is northward, consistent with historical groundwater data. The horizontal hydraulic gradient in the lower aquifer was calculated using the measured difference in head between MW50, located south of the Site, and MW52, located northwest of the Site in the wetlands. This difference, 1.07 feet on June 26, 2000, was divided by the lateral distance between the two wells (2,429 feet). Based on this calculation, the horizontal hydraulic gradient in the lower aquifer is 0.00044. This is consistent with the relatively low gradients historically calculated for the lower aquifer, as summarized below.

Report of Hydraulic Gradient in Lower Aquifer		Horizontal Hydraulic Gradient
Technical Memorandum	(October 1995)	0.00041
Lower Aquifer Tech Memo	(September 1996)	0.00047
Groundwater Monitoring Report	(August 1996)	0.00047
Groundwater Monitoring Report	(November 1996)	0.00049
Groundwater Monitoring Report	(March 1997)	0.00040
Groundwater Monitoring Report	(June 1997)	0.00044
Groundwater Monitoring Report	(September 1997)	0.00035
Groundwater Monitoring Report	(December 1997)	0.00039
Groundwater Monitoring Report	(June 1998)	0.00042
Groundwater Monitoring Report	(September 1998)	0.00029
Groundwater Monitoring Report	(December 1998)	0.00024
Groundwater Monitoring Report	(March 1999)	0.00033
Groundwater Monitoring Report	(June 1999)	0.00038
Groundwater Monitoring Report	(September 1999)	0.00035
Groundwater Monitoring Report	(November 1999)	0.00030
Groundwater Monitoring Report	(March 2000)	0.00039
Groundwater Monitoring Report	(June 2000)	0.00044
	Average	**0.00039**

3.1.4 Vertical Gradients in the Lower Aquifer

Seven nested well sets are screened in the lower aquifer. At each location, there are two or three monitoring wells and/or piezometers, each screened at a different depth within the lower aquifer. The depth intervals include the upper portion, the middle portion, and the lower portion.

The water level elevations at each of these wells (Table 1) were used to calculate vertical hydraulic gradients in the lower aquifer at each location. Table 6 summarizes the calculated vertical gradients. Calculated vertical gradients from June 2000 are shown in their historical context in the following tabulation:

Well/Piezometer Nest	June 1998	Sept 1998	Nov 1998	Mar 1999	June 1999	Sept 1999	Nov 1999	Mar 2000	June 2000
MW7/PZ44	WU	NA	WU	WU	WU	-0.0016	0.0064	-0.0016	-0.1208
MW8/MW32	WU	WU	-0.0033	0.0011	-0.0007	0.0227	WU	0.0017	-0.0009
MW9R/MW34	NA	WU	0.0006	WU	0.0037	0.0040	0.0037	0.0040	0.0035
MW30/MW33	NA	NA	WU	WU	-0.0058	WU	-0.0005	WU	-0.0063
MW28/PZ43	0.0021	0.0045	0.0008	0.0011	0.0025	0.0140	0.0029	-0.0012	-0.0025
MW52/MW53	-0.001	-0.0006	-0.0008	-0.0012	-0.0008	-0.0002	-0.0008	-0.0010	-0.0010
MW54R/MW55	NA	NA	NA	-0.0069	-0.0077	-0.0071	-0.0020	-0.0055	-0.0061

Notes

WU= Within uncertainty of measurement technique.

NA = A water elevation necessary for the calculation was not available.

Negative value indicates downward gradient.

Of the calculated vertical gradients across the lower aquifer, ten were downward, two were upward, and one was within the uncertainty of the measurement technique. Consistent downward vertical gradients are observed at well nests MW52/MW53 and MW54R/MW55, and consistent upward vertical gradients are observed at well nest MW9R/MW34. There appears to be a slightly downward gradient at most locations. The calculated downward gradient at MW7/PZ44 was significantly greater than in previous sampling events. The reason for this is not known. All other gradients showed similar readings to previous sampling events.

3.1.5 Vertical Gradient Between Upper and Lower Aquifer

Groundwater elevations from upper and lower aquifer monitoring points were utilized to calculate the vertical hydraulic gradient between the two aquifers at three locations (P28/MW8, P27/MW9R, and P8/MW7). Vertical gradients were calculated by dividing the difference in head between the upper and lower aquifer wells by the thickness of the clay-confining layer between the two wells. These are summarized in Table 7. The gradients at these locations are consistent with previous findings. The results show that there is a relatively strong downward gradient from the upper aquifer to the lower aquifer.

3.2 MONITORING WELL SAMPLE DATA

Groundwater samples were analyzed for indicator parameters (PCE, TCE, TCA, DCE, 1,2-DCE, VC, chloroethane, benzene, arsenic, and lead). The laboratory results were validated in accordance with U.S. EPA Region V guidelines, *U.S. EPA Contract Laboratory Program National Functional Guidelines For Organic Data Review (8/94)* and *Inorganic Data Review (2/00)*. Evaluation of the data is discussed in Section 4.0. Validation narratives and laboratory analytical reports for samples from the upper aquifer and the lower aquifer are provided in Appendices C and D, respectively.

The analytical results for the June 2000 quarterly sampling were evaluated for evidence of contaminant migration, changes in contaminant concentrations over time in response to remedial actions, and the presence of contaminants in the lower aquifer. Time trend plots for monitoring wells MW48, MW49, MW9R, and MW10C are presented in Appendix B. The following sections summarize the results of the organic analyses in the upper aquifer (Section 3.2.1), the organic analyses in the lower aquifer (Section 3.2.2), and the inorganic analyses in both aquifers (Section 3.2.3).

3.2.1 Groundwater Sampling Results in the Upper Aquifer

The ACS Site, except for the wetlands, has been identified as the source of groundwater contamination in the upper aquifer. The Site source areas are currently contained within the barrier wall, which prevents future migration of contaminants to adjacent areas. Since the source is contained, the groundwater monitoring program is focused on the adjacent areas not confined by the barrier wall. These surrounding areas are: the areas north and west of the ACS Facility, referred to as the North Area; the area south/southeast of Colfax Avenue, referred to as the South Area; and the Town of Griffith Landfill, which covers the area to the southwest of the ACS Site. During this minor event, only two monitoring wells in the North Area, MW48 and MW49, were sampled.

Table 8 and Figure 3 present a summary of indicator organic compounds detected in groundwater samples collected from these wells during the June 2000 sampling event. Appendix A also provides a summary table of the analytical data for this round.

3.2.1.1 VOCs

Figure 3 shows the location of VOC detections in MW48 and MW49 on a map of the ACS Site. The impact to groundwater in the North Area is comprised primarily of chloroethane and benzene. No other VOCs were detected during this sampling event. None of the VOC concentrations exceeded maximum baseline concentrations (Appendix A).

Chloroethane and benzene were detected in interior wells MW48, but were not detected in MW49. Concentrations of benzene and chloroethane in these wells continue to show decreasing trends. Time trend plots for these compounds are found in Appendix B. The following table summarizes historical benzene and chloroethane detections in MW48 and MW49:

Monitoring Wells MW48 and MW49 (Upper Aquifer)

Monitoring Well	MW48		MW49	
Sampling Date	Benzene	Chloroethane	Benzene	Chloroethane
Baseline Value	9,500 μg/L	1,000 μg/L	6,750 μg/L	715 μg/L
August 1996	9,100 μg/L	1,000 μg/L	5,000 μg/L	480 μg/L
March 1997	5,200 μg/L	620 μg/L	1,600 μg/L	310 μg/L
June 1997	7,700 μg/L	670 μg/L	4,800 μg/L	540 μg/L
September 1997	9,500 μg/L	980 μg/L	8,200 μg/L	810 μg/L
December 1997	3,800 μg/L	300 μg/L	3,300 μg/L	250 μg/L
June 1998	9,500 μg/L	720 μg/L	4,500 μg/L	450 μg/L
September 1998	7,800 μg/L	610 μg/L	4,700 μg/L	650 μg/L
December 1998	5,500 μg/L	420 μg/L	4,200 μg/L	440 μg/L
March 1999	1,900 μg/L	83 μg/L	1,900 μg/L	180 μg/L
June 1999	5,700 μg/L	290 μg/L	2,600 μg/L	220 μg/L
September 1999	5,400 μg/L	290 μg/L	2,200 μg/L	210 μg/L
November 1999	2,400 μg/L	140 μg/L	2,400 μg/L	260 μg/L
March 2000	220 μg/L	24 μg/L	530 μg/L	91 μg/L
June 2000	3,800 μg/L	160 μg/L	ND	ND

Note:
ND = Not detected

3.2.1.2 SVOCs

Semivolatile organic compounds (SVOCs) were not analyzed as part of the June 2000 groundwater monitoring activities within the upper aquifer in accordance with the approved Groundwater Monitoring Plan.

3.2.1.3 Pesticides and PCBs

Pesticides and PCBs were not analyzed as part of the June 2000 groundwater monitoring activities within the upper aquifer in accordance with the approved Groundwater Monitoring Plan.

3.2.1.4 Tentatively Identified Compounds (TICs)

No VOC tentatively identified compounds (TICS) were detected in upper aquifer monitoring wells MW48 and MW49 during the June 2000 groundwater monitoring event.

3.2.2 Groundwater Sampling Results from the Lower Aquifer

Table 9 presents a summary of indicator organic compounds detected in groundwater samples collected from two lower aquifer monitoring wells, MW09R and MW10C, during the June 2000 sampling event. Appendix A also provides a summary table of the analytical data for this round.

3.2.2.1 VOCs

Chloroethane and benzene were detected in MW09R and MW10C at concentrations within the range of previous detections for these wells. Figure 4 summarizes the VOC detections in groundwater samples collected from these two lower aquifer monitoring wells. No

VOCs were detected above the maximum baseline concentrations in the June 2000 sampling event.

In MW09R, benzene concentrations decreased from previous concentrations, while chloroethane concentrations increased slightly. A time trend plot for these compounds is found in Appendix B. The following tabulation shows the historical concentration trends at the MW09R location.

Sampling Date Baseline Value	Benzene 310 μg/L	Chloroethane 2900 μg/L
March 1997	310 μg/L	2900 μg/L
June 1997	280 μg/L	1700 μg/L
September 1997	290 μg/L	1800 μg/L
December 1997	260 μg/L	2000 μg/L
June 1998*	110 μg/L	1400 μg/L
September 1998*	100 μg/L	2000 μg/L
December 1998*	160 μg/L	2300 μg/L
March 1999*	130 μg/L	760 μg/L
June 1999*	160 μg/L	490 μg/L
September 1999*	120 μg/L	650 μg/L
November 1999*	160 μg/L	540 μg/L
March 2000*	120 μg/L	460 μg/L
June 2000*	60 μg/L	660 μg/L

*Sample collected from replacement well MW09R

In June 2000, concentrations of benzene and chloroethane at MW10C were similar to previous detections. Although concentrations did not exceed maximum baseline concentrations, the benzene concentration did equal the baseline concentration. A time trend plot for these compounds is included in Appendix B. The following tabulation shows the historical concentrations of benzene and chloroethane at MW10C.

Sampling Date Baseline Value	Benzene 150 μg/L	Chloroethane 420 μg/L
May 1990	ND	ND
January 1995	ND	ND
November 1996	ND	120 μg/L
March 1997	ND	140 μg/L
June 1997	ND	440 μg/L
September 1997	ND	420 μg/L
December 1997	ND	160 μg/L
June 1998	ND	160 μg/L
December 1998	66 μg/L	150 μg/L
(cont.)		

Sampling Date	Benzene	Chloroethane
Baseline Value	150 μg/L	420 μg/L
June 1999	2,000 μg/L	2,600 μg/L
September 1999	83 μg/L	88 μg/L
November 1999	340 μg/L	360 μg/L
March 2000	120 μg/L	180 μg/L
June 2000	150 μg/L	160 μg/L

3.2.2.2 SVOCs

SVOCs were not analyzed as part of the June 2000 groundwater monitoring activities within the lower aquifer in accordance with the approved Groundwater Monitoring Plan.

3.2.2.3 Pesticides and PCBs

Pesticides and PCBs were not analyzed as part of the June 2000 groundwater monitoring activities within the lower aquifer in accordance with the approved Groundwater Monitoring Plan.

3.2.2.4 Tentatively Identified Compounds (TICs)

VOC TICs were detected in the two lower aquifer monitoring wells sampled during June 2000. Diisopropyl ether and an unknown TIC were detected in MW09R at low concentrations. 1,4 Dioxane and an unknown were detected in MW10C. The concentration of the unknown in MW10C was 2,100 μg/L. Ether has historically been detected at MW10C, and may be the unknown TIC in MW10C. The complete listing of TICs is compiled in Appendix D along with the analytical results.

3.2.3 Inorganic Chemical Species

The June 2000 inorganic results are compiled in Appendix A along with the maximum baseline concentrations. None of the monitoring wells had exceedances of baseline concentrations during the June 2000 sampling event.

4.0 SUMMARY AND CONCLUSIONS

4.1 SUMMARY OF GROUNDWATER FLOW SYSTEMS

Groundwater flow systems for both the upper and lower aquifers were found to be consistent with those in previous monitoring events. There were a few minor changes from the baseline groundwater flow system. North of the Site, the effect of the PGCS was muted possibly by high water levels. South of the Site, a groundwater mound divided the groundwater flow. Groundwater flow within the upper aquifer is from the east and is diverted by the barrier wall toward the north/northwest and south/southwest around the ACS Site. Consistent with historical data, the groundwater flow within the lower aquifer is northward. Vertical gradients within the upper aquifer in the wetlands are generally upwards. Vertical gradients measured within the lower aquifer were either small or variable, and vertical gradients between the upper and lower aquifers were downward as in the past.

4.2 SUMMARY OF MONITORING WELL SAMPLE DATA

VOCs were detected in three of the four monitoring well samples collected from both the upper and lower aquifers. Benzene concentrations equaled baseline concentrations at monitoring well MW10C. No other VOCs exceeded baseline concentrations within the upper and lower aquifers.

SVOCs were not analyzed in the upper and lower aquifer samples.

Pesticides and PCBs were not analyzed in the upper and lower aquifer samples.

Inorganic compounds were detected in both the upper and lower aquifer samples. None of the inorganic compounds exceeded baseline concentrations.

In the upper aquifer monitoring wells, no TICs were detected. In the lower aquifer monitoring wells, two TICS were detected in monitoring well MW09R and MW10C.

4.3 CONCLUSIONS

The following conclusions can be drawn for each objective of the Groundwater Monitoring Plan.

Objective 1 was to collect water level data to monitor groundwater flow in the upper and lower aquifers and calculate the hydraulic gradients between the aquifers. The data collected indicates that groundwater flow directions and groundwater gradients for the June

2000 sampling event are consistent with past conditions for both the upper and lower aquifers.

Objective 2 was to collect water level data to document the performance of the PGCS and BWES and to evaluate changes in the groundwater flow system resulting from the remedial actions. The data indicate the barrier wall is containing the groundwater enclosed within the wall. In general, groundwater flow from the east is diverted toward the north/northwest and south/southwest. The groundwater diverted north/northwest is either collected in the PGCS extraction trench or continues to the wetlands. Groundwater diverted south/southwest flows along the barrier wall towards the southwest. These observations are consistent with previous observations.

Objective 3 was to collect and analyze groundwater samples from the interior of the areas of contaminated groundwater to document how concentrations change with time and in response to the remedial actions. Analytical results for samples collected during June 2000 indicate no exceedances of baseline concentrations for indicator VOCs and inorganics for both upper and lower aquifer monitoring wells. In the North Area, concentrations of benzene and chloroethane in groundwater samples from MW48 and MW49 continue to show decreasing trends, and no indicator VOCs were detected in the groundwater sample from monitoring well MW49 during June 2000. These decreasing trends may be the related to the ORC Pilot Study, as these wells are directly downgradient of the ORC injection areas. Due to seasonal fluctuations of water levels and contaminant concentrations in this area, this monitoring well will continue to be monitored during future sampling events to determine if the decreasing trends continue.

Objective 4 was to assess progress toward attaining cleanup objectives in the contaminated areas. Concentrations of benzene and chloroethane in MW48 and MW49 have shown decreasing trends, which may be related to oxygen release compound (ORC©) injection in that area. Concentrations at MW09R and MW10C have shown stable or decreasing trends.

In summary, the groundwater monitoring data at the ACS Site demonstrate that the BWES is working to contain contaminants inside the barrier wall, that contamination outside of the barrier wall has not migrated beyond its historical extent, and that concentrations in contaminated areas outside of the barrier wall have decreased in several areas. While some sample results show variability, most are below baseline values or show decreasing concentration trends. Sample results from the North Area show that the BWES, PGCS, and ORC are resulting in reduced concentrations. Groundwater elevation data indicate that no significant changes have occurred in the groundwater flow directions at the Site.

CAS/cas/PJV/CAS/emp
J:\209\0601 ACS\0304 Groundwater Monitoring\June 2000\202090603a09.doc
2090603.030401

Table 1
Groundwater Level Gauging Points - June 2000
American Chemical Service NPL Site
Griffith, Indiana

Upper Aquifer Wells

Well Designation	Reference Points East	North	TOIC	6/26/00 level	Elevation	Notes
MW6	5298	5520	655.28	22.77	632.51	
MW11	6377	7329	640.47	5.41	635.06	
MW12	6019	6352	642.74	7.75	634.99	
MW13	5050	7814	634.08	2.63	631.45	
MW14	4882	6995	638.56	7.25	631.31	
MW15	4721	5003	637.89	5.05	632.84	
MW18	5836	5746	644.89	9.25	635.64	TD=11.80
MW19	5231	4943	635.78	2.70	633.08	
MW37	5395	7976	636.78	3.22	633.56	
MW38	5903	8216	636.51	4.09	632.42	
MW39	6253	7947	637.77	4.20	633.57	
MW40	6349	6831	639.46	4.03	635.43	
MW41	6242	4517	632.74	3.35	629.39	
MW42	6264	3808	632.32	3.48	628.84	
MW43	5880	3719	633.56	3.92	629.64	
MW44	5390	4303	633.04	3.05	629.99	
MW45	5830	4388	635.35	5.12	630.23	
MW46	4526	7424	633.32	NM	NM	Could not find due to high water and wetland growth
MW47	5958	5084	640.54	5.35	635.19	
MW48	5669	7814	636.36	3.82	632.54	
MW49	5551	7650	637.00	3.79	633.21	
M1S	4362	5743	639.09	3.85	635.24	Griffith Landfilll Wells
M4S	4953	6537	633.42	2.50	630.92	Griffith Landfilll Wells

Staff Gauges

Well Designation	Reference Points East	North	TOSG	6/26/00 level	Elevation	Notes
SG2	4423	6864	622.84	NM	NM	Does Not Exist - Covered by landfill
SG7	5403	6889	637.01	0.7	636.3	
SG8R	5409	5252	634.70	0.8	633.9	
SG1	5023	6196	633.50	NM	NM	Could not find due to high water and weeds
SG3	4180	7123	631.17	NM	NM	Could not find due to high water and weeds
SG5	5464	7713	633.36	2.78	630.58	
SG6	4495	8075	632.97	1.60	631.37	
SG11	5859	8245	634.62	NM	NM	Could not find due to thick brush
SG12	5596	7867	634.12	2.94	631.18	

All depth measurements and elevations are in units of feet.
Elevation is in feet above mean sea level.
TD= total depth
TOIC= top of inner casing
TOSG= top of staff gauge
NM= not measured (reason given under 'Notes' column)

Table 1
Groundwater Level Gauging Points - June 2000
American Chemical Service NPL Site
Griffith, Indiana

Lower Aquifer Wells and Piezometers

Well Designation	Reference Points			6/26/00		Notes
	East	North	TOIC	Level	Elevation	
MW28	5657	5696	648.77	24.52	624.25	
PZ42	5662	5696	648.44	24.20	624.24	
PZ43	5662	5702	648.69	24.50	624.19	
MW50	5269	5383	649.43	25.18	624.25	
PZ44	6170	6766	638.47	15.92	622.55	
MW7	6113	6732	641.46	17.40	624.06	
MW10C	5229	7554	637.45	14.11	623.34	
MW9R	4893	6990	639.05	15.56	623.49	
MW29	4886	7012	638.06	14.36	623.70	
MW34	4880	7002	638.14	14.48	623.66	
MW23	4717	7404	633.31	9.88	623.43	measured 6/27
MW24	4596	8033	635.22	12.20	623.02	
MW52	4996	7814	632.74	9.56	623.18	
MW53	4977	7833	632.87	9.74	623.13	
MW51	5198	7767	634.16	11.13	623.03	
MW30	5194	7774	634.25	11.15	623.10	
MW33	5189	7774	634.13	11.15	622.98	
MW54R	5590	7592	637.51	14.21	623.30	
MW55	5595	7604	636.63	13.64	622.99	
MW8	5934	7506	640.43	17.18	623.25	
MW31	5907	7505	641.64	18.41	623.23	
MW32	5902	7507	641.84	18.63	623.21	
M4D	4949	6538	633.32	9.70	623.62	
ATMW4D	5297	7311	637.99	14.50	623.49	

All depth measurements and elevations are in units of feet.
Elevation is in feet above mean sea level.
TOIC= top of inner casing

Table 1
Groundwater Level Gauging Points - June 2000
American Chemical Service NPL Site
Griffith, Indiana

Piezometers

Well Designation	Reference Points East	North	TOC	6/26/00 level	Elevation	Notes
LW1	4807	5070	644.57	10.88	633.69	
LW2	4662	5465	649.70	16.99	632.71	
P3	5453	6470	639.87	2.21	637.66	
P4	5432	6228	639.25	NM	NM	Destroyed
P5	5285	6510	636.70	0.60	636.10	
P6	5150	6551	638.75	NM	NM	Destroyed
P7	5950	6630	643.63	8.55	635.08	
P8	6156	6734	639.27	3.97	635.30	
P9	6134	6994	638.88	3.78	635.10	
P10	5413	5852	649.32	13.55	635.77	Strong odor
P11	5199	5900	649.14	13.44	635.70	NAPL
P12	5076	5723	650.08	NM	NM	Destroyed
P13	4878	5735	651.20	18.71	632.49	
P15	5003	6187	639.93	6.78	633.15	
P16	4673	5749	648.80	15.95	632.85	
P17	4584	6006	654.64	21.75	632.89	Inside Griffith Landfill
P18	4623	6224	649.84	4.38	645.46	Inside Griffith Landfill
P22	4636	6732	634.30	5.27	629.03	
P23	4689	7018	636.18	4.59	631.59	
P24	5002	7178	636.06	3.78	632.28	
P25	5131	7510	635.01	3.55	631.46	
P26	4764	7309	634.23	3.11	631.12	measured 6/27
P27	4904	7020	639.70	8.13	631.57	
P28	5883	7486	644.53	9.89	634.64	
P29	5738	6619	642.37	5.91	636.46	
P30	5626	6793	642.42	NM	NM	Destroyed
P31	5480	7159	641.03	2.11	638.92	
P32	5746	7026	642.32	5.90	636.42	
P35	5515	6572	641.44	NM	NM	Destroyed
P36	5410	6851	645.89	9.24	636.65	
P37	5330	6949	641.37	NM	NM	Destroyed
P38	5149	6992	639.87	NM	NM	Destroyed
P39	5940	6902	642.00	5.62	636.38	
P40	5931	7241	638.77	3.62	635.15	
P41	5663	7377	637.23	2.16	635.07	
P49	5145	6949	638.98	2.90	636.08	
P50	5129	6964	639.59	NM	NM	Destroyed
P51	3876	6859	635.07	NM	NM	Could not access due to river
P52	4100	7845	636.66	5.30	631.36	Shot with BB gun.
P53	4597	8015	636.18	4.73	631.45	
P54	4936	8081	638.28	NM	NM	Could not find due to thick brush and high water
P55	5628	7979	636.08	4.33	631.75	
P56	6405	7665	639.46	4.53	634.93	
P59	6389	6590	639.22	3.70	635.52	
P60	6111	6051	640.23	6.20	634.03	
P61	5533	5284	638.58	5.90	632.68	
P62	5665	4945	637.06	4.82	632.24	
P63	5483	7689	637.70	5.55	632.15	
EW1	5113	6942	639.50	NM	NM	Destroyed
P64	4617	7065	634.87	3.62	631.25	
P65	4615	7063	634.77	3.41	631.36	
P66	4729	7034	636.02	4.54	631.48	
P67	4732	7034	636.06	4.52	631.54	
P68	4743	7752	634.48	3.23	631.25	
P69	4741	7751	634.66	3.33	631.33	
P70	4880	7680	635.38	4.24	631.14	
P71	4876	7682	635.32	3.97	631.35	

All depth measurements and elevations are in units of feet.
Elevation is in feet above mean sea level.

TOC= top of casing
NM= not measured (reason given under 'Notes' column

Table 1
Groundwater Level Gauging Points - June 2000
American Chemical Service NPL Site
Griffith, Indiana

New Piezometers - Upper Aquifer

Well	Reference Points			6/26/00		
Designation	East	North	TOC	level	Elevation	Notes
PGCS Piezometer Sets						
P81	5577	7581	636.19	3.06	633.13	
P82	5577	7572	635.77	2.63	633.14	
P83	5577	7562	635.95	2.76	633.19	
P84	5322	7603	634.35	2.42	631.93	
P85	5326	7594	634.08	1.84	632.24	
P86	5329	7585	634.41	2.22	632.19	
P87	5121	7466	633.88	2.45	631.43	
P88	5130	7460	633.90	2.35	631.55	
P89	5137	7454	634.02	2.43	631.59	
P90	4881	7152	632.59	1.44	631.15	
P91	4889	7145	632.97	3.12	629.85	
P92	4896	7138	633.63	2.32	631.31	
BWES Piezometer Pairs						
P93	5136	7067	638.79	5.72	633.07	
P94	5146	7061	638.98	NM	NM	Destroyed
P95	5146	6532	638.58	NM	NM	Wasps; Well cap stuck
P96	5156	6537	638.39	4.63	633.76	
P97	5098	6283	638.39	5.64	632.75	
P98	5130	6279	639.35	6.28	633.07	
P99	5020	5945	644.35	11.82	632.53	
P100	5031	5948	643.93	8.39	635.54	
P101	5550	5979	650.08	16.64	633.44	
P102	5517	5996	647.18	NM	NM	Under water
P103	5672	6248	644.97	11.11	633.86	
P104	5639	6267	646.68	10.18	636.50	
P105	5885	6678	638.86	3.60	635.26	
P106	5871	6685	638.10	2.20	635.90	
P107	5766	7339	637.42	2.76	634.66	
P108	5757	7324	638.13	2.11	636.02	
ORC Piezometers						
ORC PZ1	5685	7574	638.57	4.99	633.58	
ORC PZ2	5758	7457	643.43	8.75	634.68	
ORC PZ3	5760	7540	640.24	5.95	634.29	
ORC PZ4	5827	7502	643.79	9.23	634.56	
ORC PZ5	5741	7753	636.21	3.26	632.95	
ORC PZ6	5759	7792	636.13	3.10	633.03	
ORC PZ7	5792	7839	635.85	2.86	632.99	
ORC PZ8	5813	7763	638.16	4.92	633.24	

All depth measurements and elevations are in units of feet.
Elevation is in feet above mean sea level.
TD= total depth
TOC= top off casing
NM= not measured (reason given under 'Notes' column)

Table 2
Summary of Field Parameter Results - June 2000
American Chemical Service Superfund Site
Griffith, Indiana

Well Designation	Field Parameters pH (std. units)	Conductivity (adjusted to 25° C) (S/m)	Temperature (°C)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)
MW09R	6.55	0.099	14.2	999	0.00	-175
MW10C	6.65	0.161	12.7	128	0.00	-128
MW48	6.51	0.080	15.0	34	0.00	-118
MW49	5.58	0.019	16.6	0	3.01	111

Notes:
NTU = nephelometric turbidity units
S/m = Siemers per meter
mg/L = milligrams per liter
mV = millivolts

RHS/rhs/CAS
J:\1252\042\June 2000 GW\125204222b26.xls
1252042.221601

Table 3
Upper Aquifer Wells Sampled - June 2000
American Chemical Service Superfund Site
Griffith, Indiana

	Area of Groundwater Impact	Well Identification	Location with Respect to Area of Groundwater Impacts	Monitoring Parameters March 2000
1	North	MW11	Side Gradient	
2		MW12	Side Gradient	
3		MW40	Side Gradient	
4		MW48	Internal	IND
5		MW49	Internal	IND
6		MW39	Side Gradient	
7		MW37	Downgradient	
8		MW38	Side Gradient	
9	West	MW14	Internal	
10		MW13	Internal	
11		MW46	Side Gradient	
12		M-1S	Griffith Landfill	
13		M-4S	Griffith Landfill	
14	South	MW18	Upgradient	
15		MW6	Internal	
16		MW19	Internal	
17		MW45	Internal	
18		MW41	Side Gradient	
19		MW44	Side Gradient	
20		MW47	Side Gradient	
21		MW15	Side Gradient	
22		MW42	Downgradient	
23		MW43	Downgradient	

Notes:
IND: Arsenic, lead, VC, benzene, chloroethane, TCE, PCE, TCA, DCE, and 1,2-DCA.
TCL/TAL: Full scan Target Compound List and Target Analyte List Parameters

Table 4
Lower Aquifer Wells Sampled - June 2000
American Chemical Service Superfund Site
Griffith, Indiana

	Well Identification	Well Screen Depth in Lower Aquifer	Location with Respect to Area of GW Impacts	Monitoring Parameters June 2000
1	MW28	Upper	Upgradient	
2	MW50	Upper	Upgradient	
3	MW7	Upper	Side Gradient	
4	MW10C	Upper	Internal	IND
5	MW9R	Upper	Internal	IND
6	MW29	Middle	Internal	
7	MW34	Lower	Internal	
8	MW23	Upper	Downgradient	
9	MW24	Upper	Downgradient	
10	MW52	Upper	Downgradient	
11	MW53	Lower	Downgradient	
12	MW51	Upper	Downgradient	
13	MW30	Middle	Downgradient	
14	MW33	Lower	Downgradient	
15	MW54R	Upper	Downgradient	
16	MW55	Lower	Downgradient	
17	MW8	Upper	Downgradient	
18	MW31	Middle	Downgradient	
19	MW32	Lower	Downgradient	
20	M-4D	Upper	Griffith Landfill	
21	ATMW-4D	Upper	ACS Site	

Notes:
IND: Arsenic, lead, VC, benzene, chloroethane, TCE, PCE, TCA, DCE, and 1,2-DCA.
TCL/TAL: Full scan Target Compound List and Target Analyte List Parameters

Table 5
Vertical Gradients in Wetlands - June 2000
American Chemical Service Superfund Site
Griffith, Indiana

Piezometer	Screen Interval		Screen	Separation	Groundwater Elevation			Hydraulic
Nest	Top	Bottom	Midpoint	(feet)	Upper	Lower	delta	Gradient
P64	629.05	624.10	626.58	5	631.25			
P65	622.20	620.20	621.20			631.36	0.11	0.022
P66	629.45	625.10	627.28	8	631.48			
P67	620.50	618.50	619.50			631.54	0.06	0.007
P68	628.15	623.80	625.98	6	631.25			
P69	621.10	618.60	619.85			631.33	0.08	0.013
P70	628.55	624.20	626.38	6	631.14			
P71	621.00	619.00	620.00			631.35	0.21	0.035

Notes:
Water level measurements collected on June 26, 2000.
Elevation is in feet above mean sea level.
(-) = Downward Gradient
(+) = Upward Gradient
See *September 1997 Groundwater Sampling Results Report and Groundwater Monitoring Plan* (July 1998), p. 3, for an explanation of calculation method.

Table 6
Vertical Gradients in Lower Aquifer - June 2000
American Chemical Service, Inc. NPL Site
Griffith, Indiana

Well Nest	Screen Interval Top	Screen Interval Bottom	Separation (feet)	Lowest Measurable Gradient	Groundwater Elevation Upper	Groundwater Elevation Middle	Groundwater Elevation Lower	delta	Vertical Gradients Upper/ Middle	Vertical Gradients Middle/ Lower	Vertical Gradients Upper/ Lower
MW7	595.9	590.9			624.06						
PZ44	578.4	573.4	13	0.0008		622.55		-1.51	-0.1208	NA	NA
MW8	598.2	593.2			623.25						
MW31	574.6	564.6	19	0.0005		623.23		-0.02	-0.0011		
MW32	547.3	537.3	17	0.0006			623.21	-0.02		-0.0012	-0.0009
MW9R	605.9	600.9			623.49						
MW29	585.9	575.9	15	0.0007		623.70		0.21	0.0140		
MW34	552.8	542.8	23	0.0004			623.66	-0.04		-0.0017	0.0035
MW30	585.0	575.0	13	0.0008		623.10			NA		
MW33	556.0	546.0	19	0.0005			622.98	-0.12		-0.0063	NA
MW28	588.7	578.7			624.25						
PZ42	568.5	563.5	10	0.0010		624.24		-0.01	WU		
PZ43	554.5	549.5	9	0.0011			624.19	-0.05		-0.0056	-0.0025
MW52	615.6	605.6			623.18						
MW53	555.7	545.7	50	0.0002			623.13	-0.05	NA	NA	-0.0010
MW54R	608.1	598.1			623.30						
MW55	547.6	537.6	51	0.0002			622.99	-0.31	NA	NA	-0.0061

Notes:
Water level measurements collected on June 26, 2000.
Elevation is in feet above mean sea level.
NA = Not Applicable. Calculating vertical gradient only for upper/lower interval at this location.
WU = Within uncertainty of measurement technique.
(-) = Downward Gradient
(+) = Upward Gradient
See *September 1997 Groundwater Sampling Results Report and Groundwater Monitoring Plan* (July 1998), p. 4, for an explanation of cal method.

CAS/cas/RHS
J:\1252\042\June 2000\125204222b25.xls[Table 6]
1252042.221601

Table 7
Vertical Gradients Between Upper and Lower Aquifers
June 2000
American Chemical Service Superfund Site
Griffith, Indiana

Well Designation	Screen Interval		Screen Midpoint	Separation (feet)	Groundwater Elevation			Hydraulic Gradient
	Top	Bottom			Upper	Lower	delta	
P28	634.30	629.30	631.80	11	634.64			
MW8	598.20	593.20	595.70			623.25	-11	-1.04
P27	631.02	626.02	628.52	23	631.57			
MW9R	605.90	600.90	603.40			623.49	-8	-0.36
P8	635.36	630.36	632.86	18	635.30			
MW7	595.90	590.90	593.40			624.06	-11	-0.62

Notes:
Water level measurements collected on June 26, 2000.
Elevation is in feet above mean sea level.
(-) = Downward Gradient
(+) = Upward Gradient

See *September 1997 Groundwater Sampling Results Report and Groundwater Monitoring Plan* (July 1998), p. 4, for an explanation of calculation method.

Table 8
Summary of Organic Compound Detections in the Upper Aquifer
Validated Results
June 2000
American Chemical Service Superfund Site
Griffith, Indiana

VOCs (ug/L)	MW-48			MW-49	
	Jun-00		BV	Jun-00	BV
Benzene	3,800		9,500	nd	6,750
Chloroethane	160	J/	1,000	nd	715

Notes:
ug/L = micrograms per liter
BV = Baseline Value
NA = Not analyzed for this parameter
_/_ = No data qualifier required
J/_ = Data qualifier added by laboratory
_/J = Data qualifier added by data validator
J = Estimated value
nd = indicates the parameter was not detected.

Table 9
Summary of Organic Compound Detections in the Lower Aquifer
Validated Results
June 2000
American Chemical Service Superfund Site
Griffith, Indiana

	MW-09R		MW-10C	
VOCs (ug/L)	Mar-00	BV	Mar-00	BV
Benzene	60	310	150	150
Chloroethane	660 D/	2,900	160	420

Notes:

ug/L = micrograms per liter

BV = Baseline Value

NA = Not analyzed for this parameter

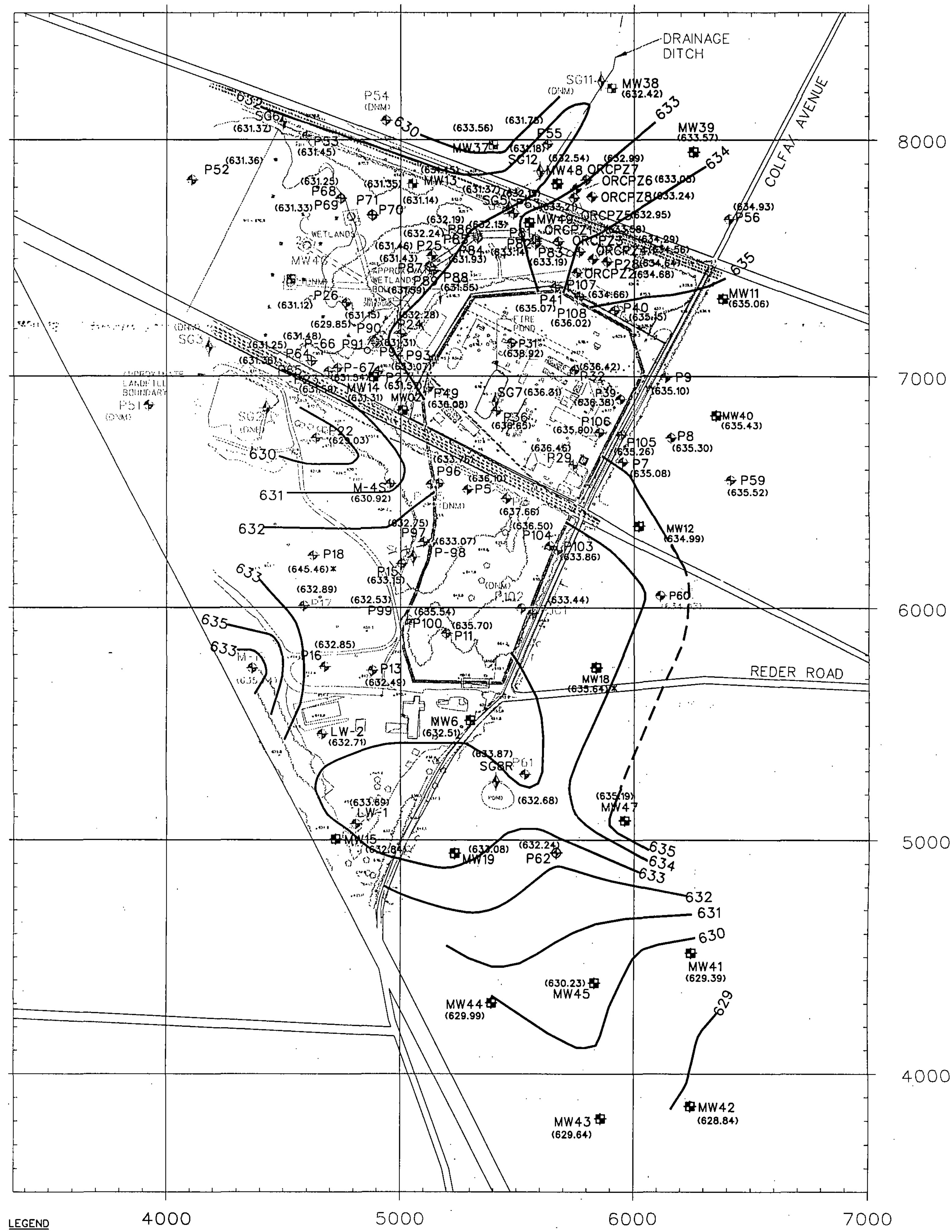
_/_ = No data qualifier required

D/_ = Data qualifier added by laboratory

_/D = Data qualifier added by data validator

D = Sample was reanalyzed at a higher dilution factor

A blank cell indicates parameter not detected.



SCALE	1"=500'

MONTGOMERY WATSON
Chicago, Illinois

AMERICAN CHEMICAL SERVICES, INC.
NPL SITE
GRIFFITH, INDIANA

UPPER AQUIFER WATER TABLE MAP
JUNE 2000

1

LEGEND

- UPPER AQUIFER WELL LOCATION AND DESIGNATION
- M-1S LEACHATE WELL LOCATION AND DESIGNATION
- P61 PIEZOMETER LOCATION AND DESIGNATION
- STAFF GAUGE LOCATION AND DESIGNATION
- O3 SURFACE DISCHARGE LOCATION FOR PERIMETER GROUND WATER CONTAINMENT SYSTEM
- ORCPZ1 ORC PIEZOMETER LOCATION AND DESIGNATION
- (632.00) GROUNDWATER ELEVATION
- (632.00) x GROUNDWATER ELEVATION MEASURED BUT NOT USED FOR DETERMINATION OF THE POTENTIOMETRIC SURFACE
- (DNM) DID NOT MEASURE
- (DNE) DOES NOT EXIST
- 630 GROUNDWATER ELEVATION CONTOUR BASED ON GROUNDWATER ELEVATION DATA (DASHED WHERE INFERRED)
- BARRIER WALL
- PERIMETER GROUND WATER CONTAINMENT SYSTEM

NOTES

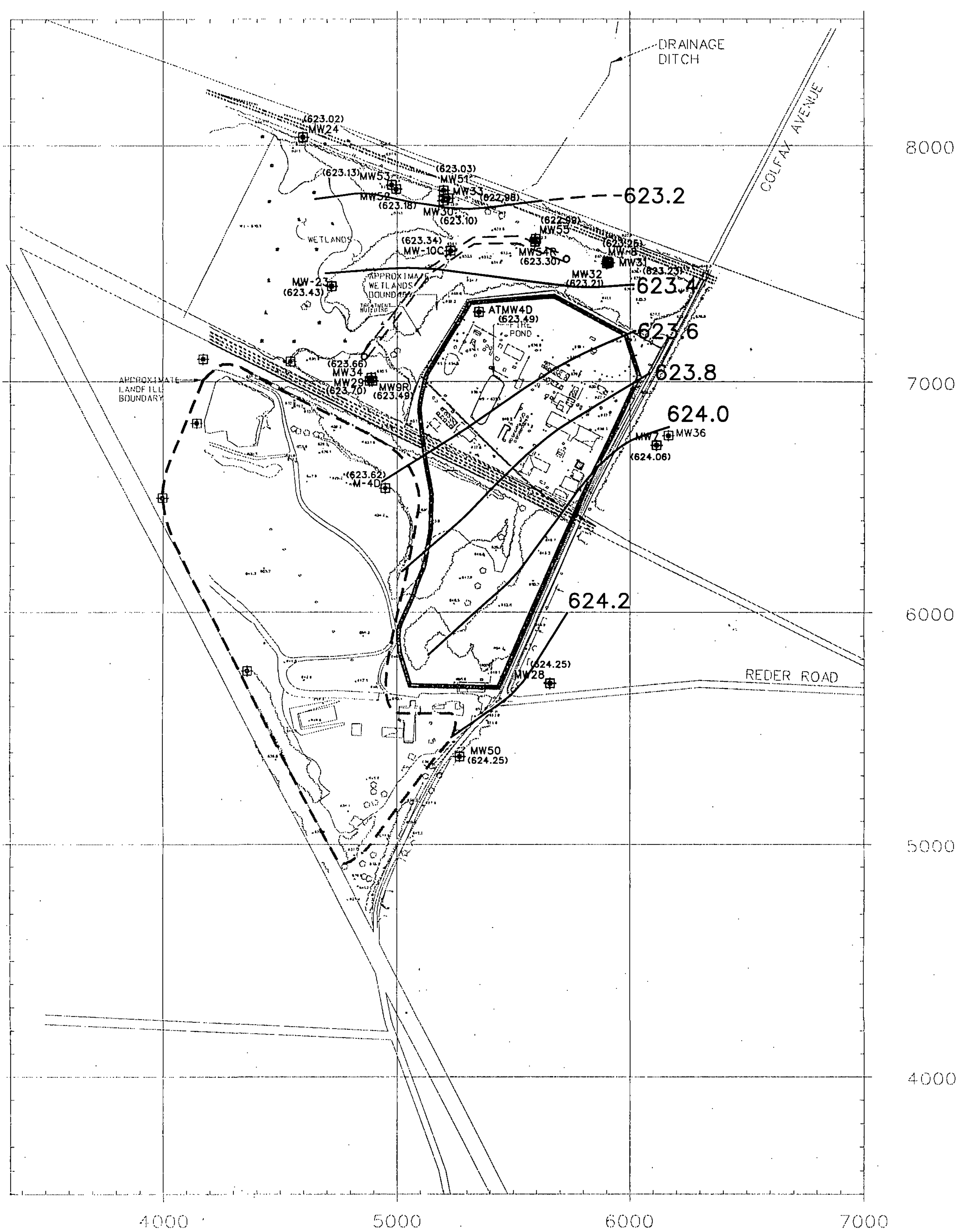
1. GROUNDWATER ELEVATIONS FOR WATER TABLE CONTOURS WERE MEASURED AT THE SITE ON JUNE 26, 2000.

N

0 500 1000

SCALE IN FEET

JOB No. MW Job No. FILE: J:/209/0601acs/0304 groundwater monitoring/mwdwgs/june_2000/upper_contour5d.dgn



LEGEND

BARRIER WALL

PERIMETER GROUND WATER CONTAINMENT SYSTEM

GRIFFITH LANDFILL BOUNDARY

MW53 LOWER AQUIFER WELL LOCATION AND DESIGNATION

(621.76) GROUNDWATER ELEVATION

621.6 — GROUNDWATER ELEVATION CONTOUR BASED ON GROUNDWATER ELEVATION DATA

0 500 1000

SCALE IN FEET

N

NOTE GROUNDWATER ELEVATIONS FOR POTENTIOMETRIC SURFACE CONTOURS WERE MEASURED ON JUNE 26, 2000

SCALE 1"=500'

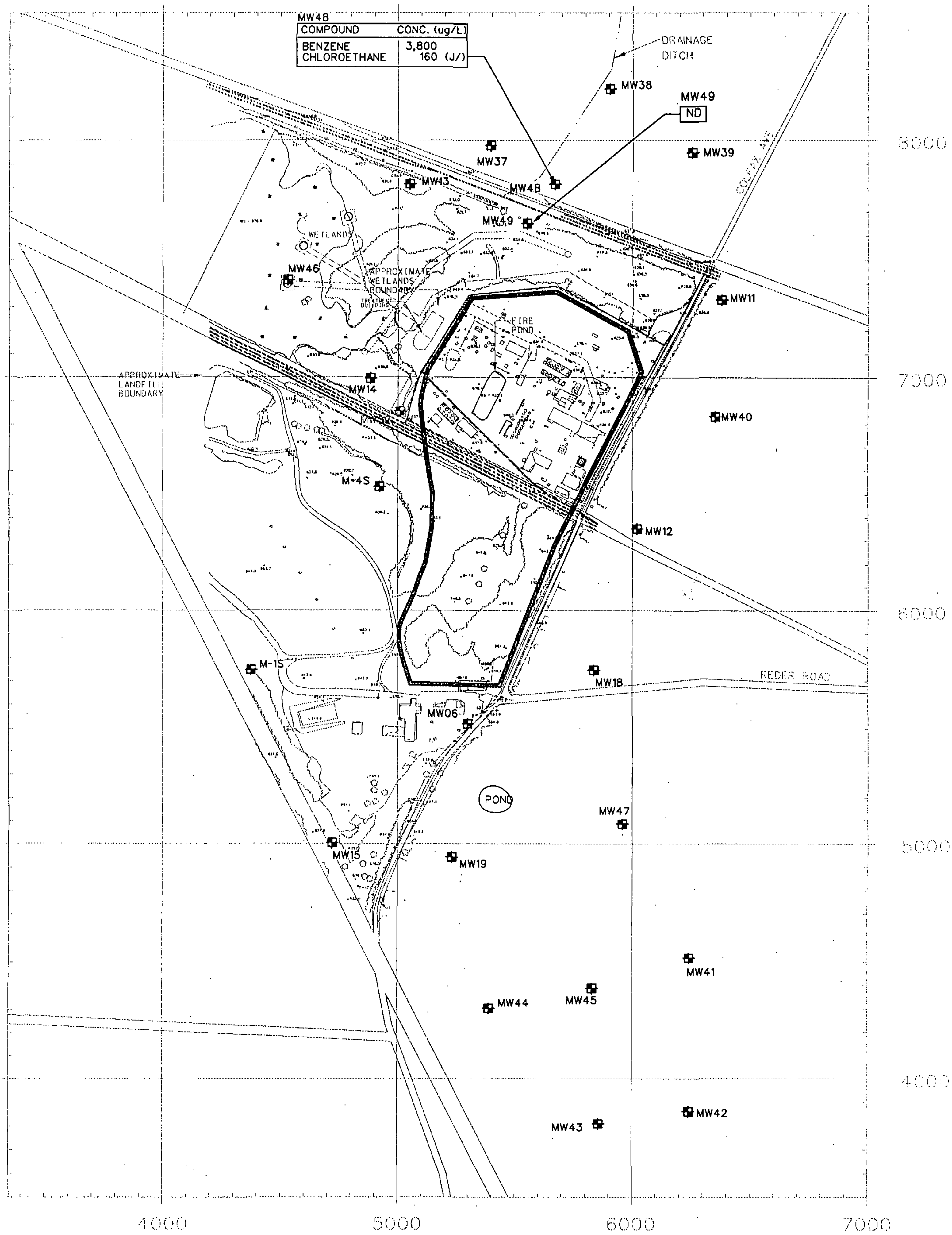
MONTGOMERY WATSON
Chicago, Illinois

AMERICAN CHEMICAL SERVICES, INC.
NPL SITE
GRIFFITH, INDIANA

LOWER AQUIFER POTENTIOMETRIC SURFACE
JUNE 2000

FIGURE 2

JOB No. MW Job No. FILE: J:/209/0601 acs/0304 groundwater monitoring/mwdwgs/june_2000/lower_contour3d.dgn



LEGEND

	UPPER AQUIFER WELL LOCATION AND DESIGNATION
	BARRIER WALL
	PERIMETER GROUND WATER CONTAINMENT SYSTEM
ug/L	MICROGRAMS PER LITER
(J)	INDICATES AN ESTIMATED VALUE (LAB/VALIDATED)
ND	NO VOC DETECTED

N

0 500 1000

SCALE IN FEET

SCALE 1"=500'

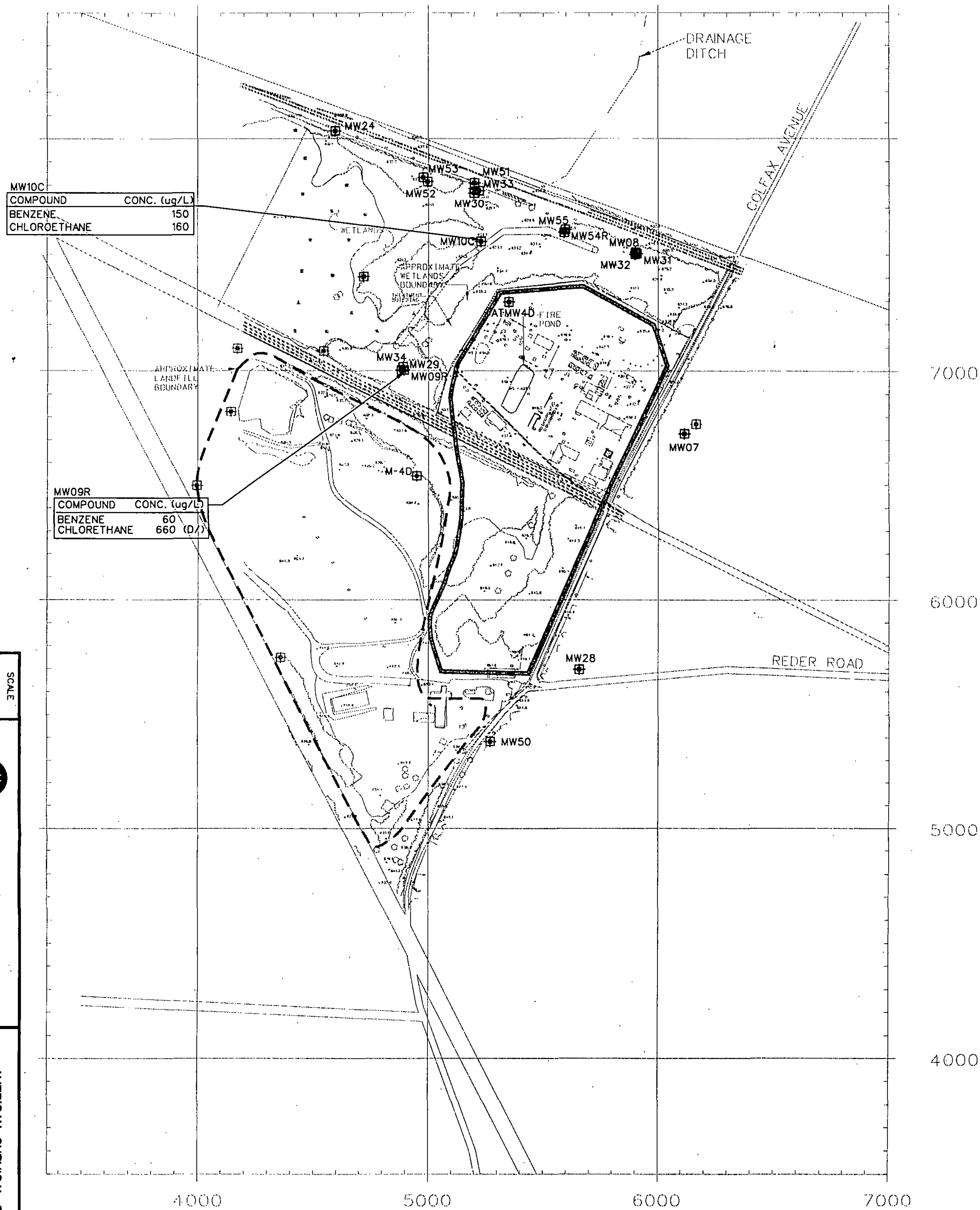
MONTGOMERY WATSON
Chicago, Illinois

AMERICAN CHEMICAL SERVICES, INC.
NPL SITE
GRIFFITH, INDIANA

VOCs DETECTED IN UPPER AQUIFER MONITORING WELLS-JUNE 2000

FIGURE 3

JOB No. MW Job No. FILE: J:/209/0601 acs/0304 groundwater monitoring/mwdwgs/june_2000/upper_spidy4d.dgn



LEGEND

BARRIER WALL

PERIMETER GROUND WATER CONTAINMENT SYSTEM

GRIFFITH LANDFILL BOUNDARY

MW53 LOWER AQUIFER WELL LOCATION AND DESIGNATION

ug/L MICROGRAMS PER LITER

(D) INDICATES SAMPLE WAS DILUTED (LAB/VALIDATED)

ND NO VOCs DETECTED

NOTE: CONCENTRATIONS IN BOLD EXCEEDED BASELINE VALUES

N

0 500 1000

SCALE IN FEET

SCALE 1"=500'

MONTGOMERY WATSON
Chicago, Illinois

AMERICAN CHEMICAL SERVICES, INC.
NPL SITE
GRIFFITH, INDIANA

VOCs DETECTED IN LOWER AQUIFER MONITORING WELL - JUNE 2000

FIGURE 4

JOB No. MW Job No. FILE: J:/209/0601acs/0304 groundwater monitoring/mwdwgs/june 2000/lower_spidy4d.dgn

APPENDIX A

COMPARISON OF NOVEMBER 1999 RESULTS
TO BASELINE MAXIMUM CONCENTRATIONS

Comparison of Results to Baseline Highest Detections
June 2000
American Chemical Services NPL Site
Griffith, Indiana

Well	Analyte	Units	Highest Detect during Baseline	Current Event			
				Result	LQ	DQ	Detect Limit
MW-09R	1,1,1-Trichloroethane	UG/L	200		U		10
MW-09R	1,1,2-Trichloroethane	UG/L	200		U		10
MW-09R	1,1-Dichloroethene	UG/L	200		U		10
MW-09R	Benzene	UG/L	310	60			10
MW-09R	Chloroethane	UG/L	2,900	660	D		10
MW-09R	cis-1,2-Dichloroethene	UG/L			U		10
MW-09R	Tetrachloroethene	UG/L	200		U		10
MW-09R	trans-1,2-Dichloroethene	UG/L			U		10
MW-09R	Trichloroethene	UG/L	200		U		10
MW-09R	Vinyl chloride	UG/L	200		U		10
MW-10C	1,1,1-Trichloroethane	UG/L	150		U		10
MW-10C	1,1,2-Trichloroethane	UG/L	150		U		10
MW-10C	1,1-Dichloroethene	UG/L	150		U		10
MW-10C	Benzene	UG/L	150	150			10
MW-10C	Chloroethane	UG/L	420	160			10
MW-10C	cis-1,2-Dichloroethene	UG/L			U		10
MW-10C	Tetrachloroethene	UG/L	150		U		10
MW-10C	trans-1,2-Dichloroethene	UG/L			U		10
MW-10C	Trichloroethene	UG/L	150		U		10
MW-10C	Vinyl chloride	UG/L	129		U		10
MW-48	1,1,1-Trichloroethane	UG/L	500		U		500
MW-48	1,1,2-Trichloroethane	UG/L	500		U		500
MW-48	1,1-Dichloroethene	UG/L	500		U		500
MW-48	Benzene	UG/L	9,500	3,800			500
MW-48	Chloroethane	UG/L	1,000	160	J		500
MW-48	cis-1,2-Dichloroethene	UG/L			U		500
MW-48	Tetrachloroethene	UG/L	500		U		500
MW-48	trans-1,2-Dichloroethene	UG/L			U		500
MW-48	Trichloroethene	UG/L	500		U		500
MW-48	Vinyl chloride	UG/L	500		U		500
MW-49	1,1,1-Trichloroethane	UG/L	500		U		10
MW-49	1,1,2-Trichloroethane	UG/L	500		U		10
MW-49	1,1-Dichloroethene	UG/L	500		U		10
MW-49	Benzene	UG/L	6,750		U		10
MW-49	Chloroethane	UG/L	715		U		10
MW-49	cis-1,2-Dichloroethene	UG/L			U		10
MW-49	Tetrachloroethene	UG/L	500		U		10
MW-49	trans-1,2-Dichloroethene	UG/L			U		10
MW-49	Trichloroethene	UG/L	500		U		10
MW-49	Vinyl chloride	UG/L	500		U		10

BOLD = Exceedance
NA = Not Applicable

CAS/cas/RHS/CAS
J:\1252\042\Databases\1998\ACS GW.mdb[rptNewResultsVOC]
1252042.221601

Comparison of Results to Baseline Highest Detections
June 2000
American Chemical Services NPL Site
Griffith, Indiana

Well	Analyte	Units	Highest Detect during Baseline	Current Event			
				Result	LQ	DQ	Detect Limit
MW-09R	Arsenic	UG/L	6.8	2.4	B		10
MW-09R	Lead	UG/L	6.7		U		1.3
MW-48	Arsenic	UG/L	13	8.8	B		10
MW-48	Lead	UG/L	7.7	1.3	B		3
MW-49	Arsenic	UG/L	38		U		2.3
MW-49	Lead	UG/L	4.4		U		1.3

BOLD = Exceedance
NA = Not Applicable

CAS/cas/RHS/CAS
J:\1252\042\Databases\1998\ACS GW.mdb[rptNewResultsInorg]
1252042.221601

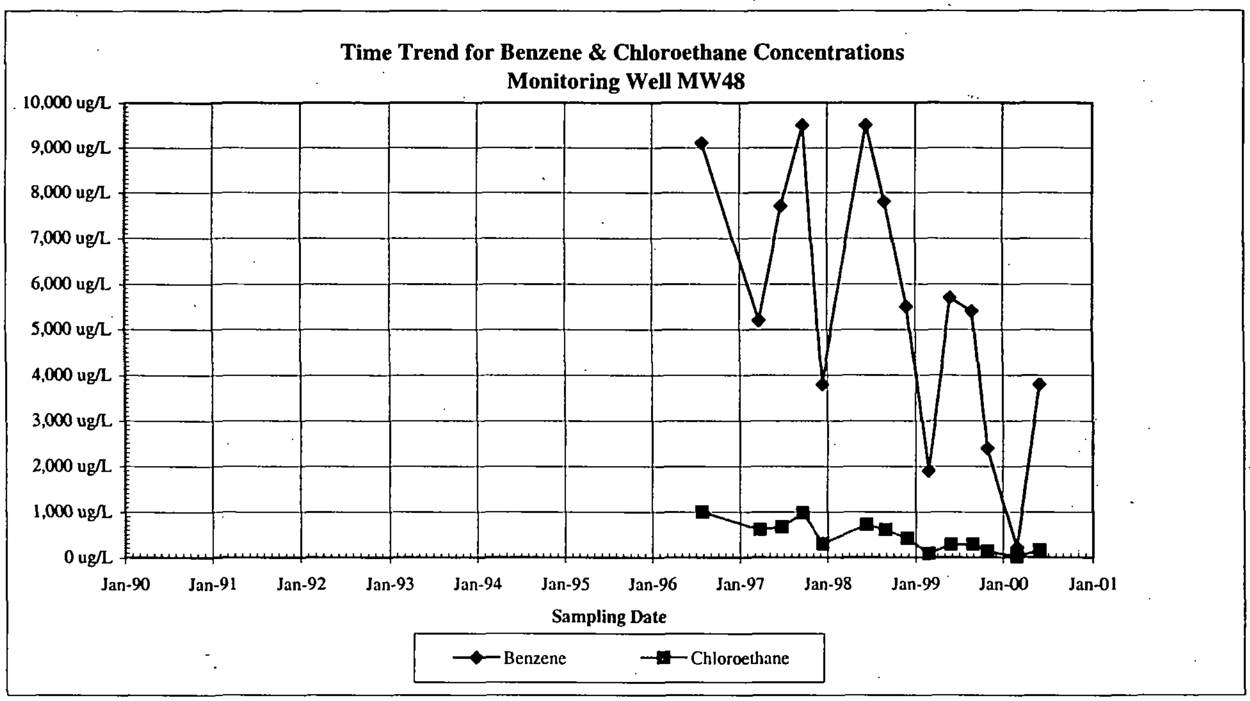
APPENDIX B

TIME TREND PLOTS

Baseline Groundwater Monitoring
ACS NPL Site

MW48

Date	Benzene	Chloroethane
Baseline	**9500**	**1000**
August-89		
May-90		
December-94		
August-96	9,100 ug/L	1,000 ug/L
March-97	5,200 ug/L	620 ug/L
June-97	7,700 ug/L	670 ug/L
September-97	9,500 ug/L	980 ug/L
December-97	3,800 ug/L	300 ug/L
June-98	9,500 ug/L	720 ug/L
September-98	7,800 ug/L	610 ug/L
December-98	5,500 ug/L	420 ug/L
March-99	1,900 ug/L	83 ug/L
June-99	5,700 ug/L	290 ug/L
September-99	5,400 ug/L	290 ug/L
November-99	2,400 ug/L	140 ug/L
March-00	220 ug/L	24 ug/L
June-00	3,800 ug/L	160 ug/L

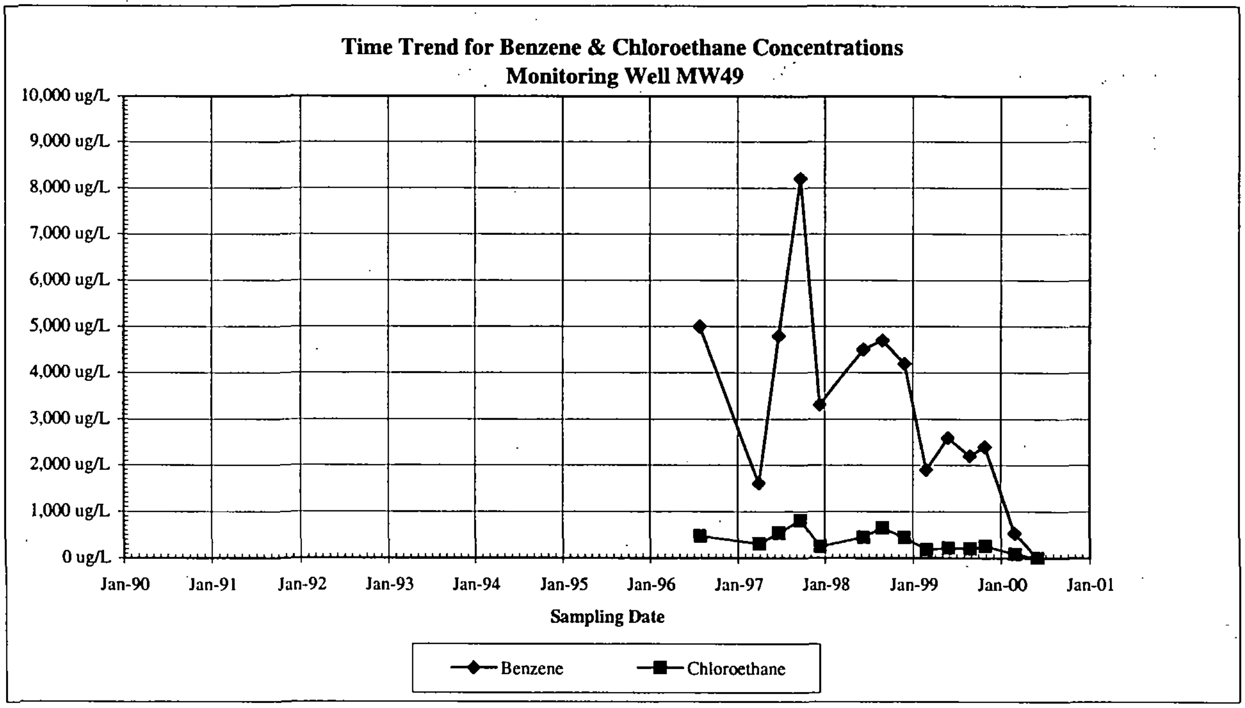


Upper Aquifer Monitoring Well: MW49

Baseline Groundwater Monitoring
ACS NPL Site

MW49

Date	Benzene	Chloroethane
Baseline	**6750**	**715**
August-89		
May-90		
December-94		
August-96	5,000 ug/L	480 ug/L
April-97	1,600 ug/L	310 ug/L
June-97	4,800 ug/L	540 ug/L
September-97	8,200 ug/L	810 ug/L
December-97	3,300 ug/L	250 ug/L
June-98	4,500 ug/L	450 ug/L
September-98	4,700 ug/L	650 ug/L
December-98	4,200 ug/L	440 ug/L
March-99	1,900 ug/L	180 ug/L
June-99	2,600 ug/L	220 ug/L
September-99	2,200 ug/L	210 ug/L
November-99	2,400 ug/L	260 ug/L
March-00	530 ug/L	91 ug/L
June-00	ND	ND



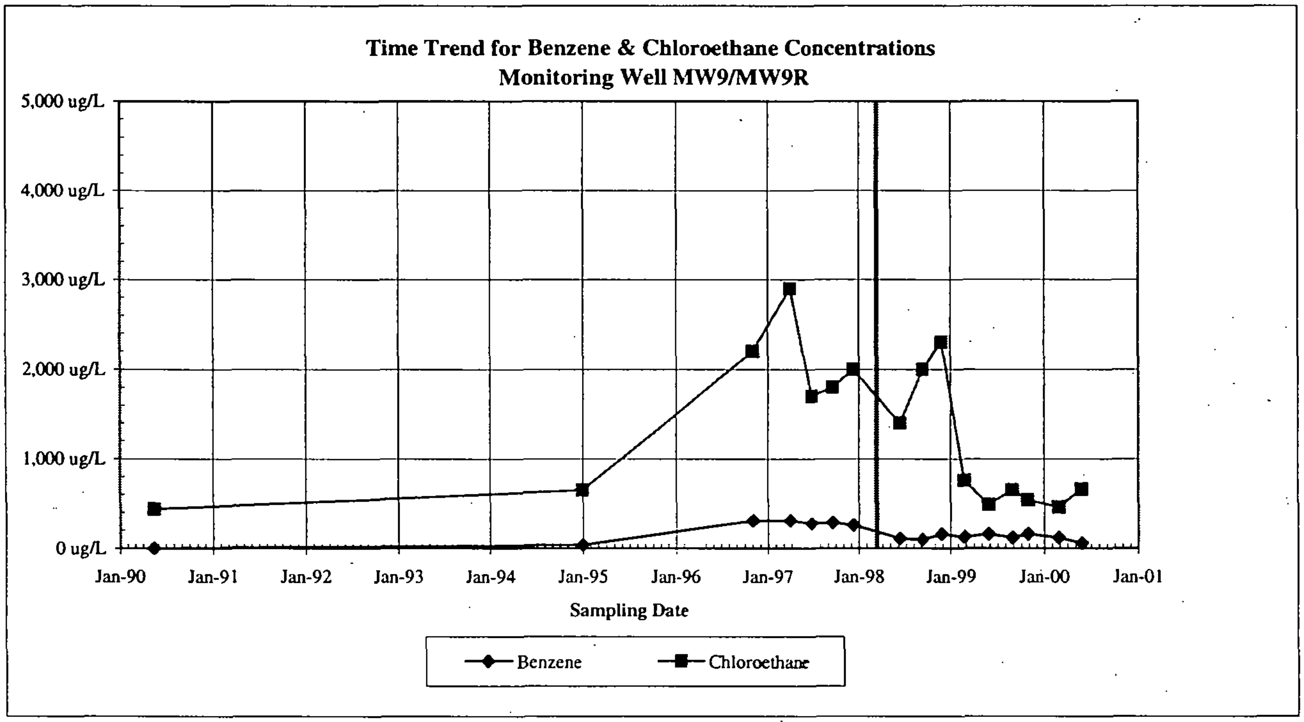
Lower Aquifer Monitoring Well: MW9/MW9R

Baseline Groundwater Monitoring
ACS NPL Site

MW9/MW9R

Date	Benzene	Chloroethane
BASELINE	**310**	**2900**
August-89		
May-90	BDL	440 ug/L
January-95	40 ug/L	650 ug/L
November-96	310 ug/L	2,200 ug/L
April-97	310 ug/L	2,900 ug/L
June-97	280 ug/L	1,700 ug/L
September-97	290 ug/L	1,800 ug/L
December-97	260 ug/L	2,000 ug/L
June-98	110 ug/L	1,400 ug/L
September-98	100 ug/L	2,000 ug/L
December-98	160 ug/L	2,300 ug/L
March-99	130 ug/L	760 ug/L
June-99	160 ug/L	490 ug/L
September-99	120 ug/L	650 ug/L
November-99	160 ug/L	540 ug/L
March-00	120 ug/L	460 ug/L
June-00	60 ug/L	660 ug/L

BDL = Below the Detection Limit



Line indicates change to replacement well

JMK/JMS/CAS
J:1252\042\Database
Timetrnd-LA.xls[MW9]

10/5/00

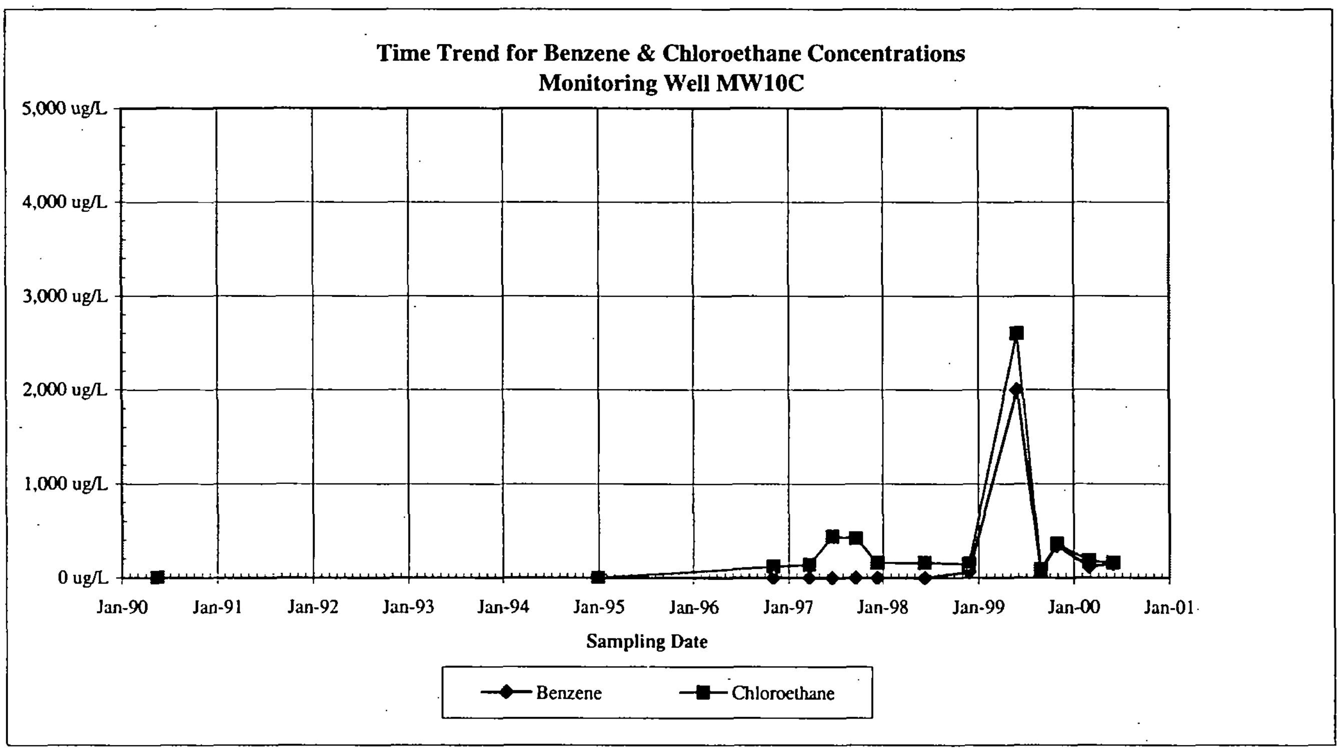
Lower Aquifer Monitoring Well: MW10C

Baseline Groundwater Monitoring
ACS NPL Site

MW10C

Date	Benzene	Chloroethane
BASELINE	**150**	**420**
August-89		
May-90	BDL	BDL
January-95	BDL	BDL
November-96	BDL	120 ug/L
March-97	BDL	140 ug/L
June-97	BDL	440 ug/L
September-97	BDL	420 ug/L
December-97	BDL	160 ug/L
June-98	BDL	160 ug/L
December-98	66 ug/L	150 ug/L
June-99	2,000 ug/L	2,600 ug/L
September-99	83 ug/L	88 ug/L
November-99	340 ug/L	360 ug/L
March-00	120 ug/L	180 ug/L
June-00	150 ug/L	160 ug/L

BDL = Below the Detection Limit



JMK/JMS/CAS
J:1252\042\Database
Timetrnd-LA.xls[MW10C]

10/5/00

APPENDIX C

VALIDATION NARRATIVE AND LABORATORY REPORTS FROM UPPER AQUIFER

M E M O R A N D U M

MONTGOMERY WATSON

To: Chad Smith

From: Matthew Reeder, MW-SLC

Date: October 9, 2000

Subject: Data Validation for American Chemical Service (ACS). Griffith, Indiana.

Job No.: 1252042

SDG: V1201

INTRODUCTION

The following text is based on the validation of water samples collected at American Chemical Service, Inc. in June 2000.

Seven water samples and one QA/QC sample were analyzed by CompuChem Laboratories, Cary, North Carolina for the following parameters:

- SDG V1201 VOA, CLP-OLM 3.1, (samples: ACS-GWMW-49-13, ACS-GWMW-48-13, ACS-GWMW-10C-13, ACS-GWMW-49-913, ACS-GWMW-09R-13, ACS-GWFB-01-13, ACS-GWTB-01-13)

- SDG V1201 Arsenic and Lead, CLP-ILM 4.1, (samples: ACS-GWMW-49-13, ACS-GWMW-48-13, ACS-GWMW-49-913, ACS-GWMW-09R-13, ACS-GWFB-01-13)

Data validation was conducted in accordance with procedures specified in *Pre-Design Activities Quality Assurance Project Plan (MW, 1995), USEPA Contract Laboratory Program Statement of Work for Organic Analysis OLM03.1(U.S. EPA August 1994), USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis Multi-Media Multi-Concentration ILM04.1 (U.S. EPA February 2000);* and was also based on principles outlined in *National Functional Guidelines for Organic Data Review (USEPA, 1994a),* and *National Functional Guidelines for Inorganic Data Review (USEPA, 1994b).*

The following field quality control samples were collected during the June 2000 sampling round:

- One field blank (ACS-GWFB01-13)
- One field duplicate (ACS-GWMW49-913)
- One trip blank (ACS-GWTB01-13)

This memorandum contains a narrative summarizing the data quality objectives specified in the work plan.

SUMMARY

This section describes the quality control parameters reviewed during validation, summarizes the data quality objectives as a result of the validation and provides a summary of the deficiencies and qualification applied. The following paragraphs describe deficiencies that were identified which resulted in qualification of the sample results. Each analysis is separated into sections for clarity.

Volatile Organic Compounds

Major Deficiencies: There were no major deficiencies identified during the validation process.

Minor Deficiencies: There were no minor deficiencies identified during the validation process.

Metals (As and Pb)

Major Deficiencies: There were no major deficiencies identified during the validation process.

Minor Deficiencies: There were no minor deficiencies identified during the validation process.

DATA QUALITY OBJECTIVES

The following is a summary of the data quality objectives that were evaluated during the data validation process.

Reporting Limits: Reporting limits were met for all analyses with the following exception.

- For VOCs: Reporting limits were met with the exception of necessary dilutions. Both the original and diluted sample results were included.
- For Metals: Reporting limits were met without exception.

Accuracy

Laboratory Control Sample: Validation of the LCS was performed for inorganic analyses. The LCS for the inorganic analyses were within control limits and analyzed at the correct frequency. An LCS is not required for the VOC analyses in accordance with USEPA CLP SOW method OLM03.1.

Surrogates: The surrogate results were within laboratory specified limits without exception.

Matrix Spike / Matrix Spike Duplicate: The MS/MSD results were within laboratory specified limits.

Precision

Field Duplicates: The sample and duplicate results were ND for both analyses.

Laboratory Duplicate Sample: The laboratory duplicate results were within laboratory specified limits without exception.

The overall results were acceptable, indicating that sampling and analytical precision objectives were met for the sampling event.

Completeness

The data package was complete for the requested analyses. No results were considered unusable. The completeness was 100 percent, which meets the completeness objective of 95 percent.

Representativeness:

Trip blank ACS-GWTB01-13 had no target analytes detected above the reporting limit, indicating that the representativeness objectives for the sampling event were met.

Field Blank ACS-GWMW-49-913 had no target analytes detected above the reporting limit, for all analyses, indicating that the representativeness objectives for the sampling event were met.

Comparability:

All data were reported in similar units to facilitate comparison of results within the data packages. Samples arrived at the laboratory at 3°C, which is within the limits of 2-6°C. All holding times were met, indicating that the comparability objectives for the sampling event were met.

CONCLUSION

As a result of this evaluation, all data within this SDG for wells at American Chemical Service are of known and acceptable quality in relation to the DQOs of this project. Data are considered usable as qualified for the intended purposes.

REFERENCES

Pre-Design Activities Quality Assurance Project Plan, American Chemical Service, Inc. NPL Site, Griffith Indiana (MW, 1995).

USEPA Contract Laboratory Program Statement of Work for Organic Analysis OLM03.1(U.S. EPA August 1994),

USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis Multi-Media Multi-Concentration ILM04.1 (U.S. EPA February 2000)

National Functional Guidelines for Organic Data Review (U.S. EPA, 1994a).

National Functional Guidelines for Inorganic Data Review (U.S. EPA, 1994b).

ACS-NPL June 2000
Field Duplicate Comparisons
SDG V1201

Parameter	Sample Result	Duplicate Result	RPD	Comments
SDG V1201	**ACSGWMW49-13**	**ACSGWMW49-913**		
Vinyl Chloride	ND	ND	0.00%	
chloroethane	ND	ND	0.00%	
1,1-Dichloroethene	ND	ND	0.00%	
trans-1,2-Dichloroethene	ND	ND	0.00%	
cis-1,2-Dichloroethene	ND	ND	0.00%	
1,1,1-Trichloroethane	ND	ND	0.00%	
Benzene	ND	ND	0.00%	
Trichloroethene	ND	ND	0.00%	
1,1,2-Trichloroethane	ND	ND	0.00%	
Tetrachloroethene	ND	ND	0.00%	
Arsenic	ND	ND	0.00%	
Lead	ND	ND	0.00%	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-48-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-2

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-2D2A55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
75-01-4	Vinyl Chloride	500	U
75-00-3	Chloroethane	160	J
75-35-4	1,1-Dichloroethene	500	U
156-60-5	trans-1,2-Dichloroethene	500	U
156-59-2	cis-1,2-Dichloroethene	500	U
71-55-6	1,1,1-Trichloroethane	500	U
71-43-2	Benzene	3800	
79-01-6	Trichloroethene	500	U
79-00-5	1,1,2-Trichloroethane	500	U
127-18-4	Tetrachloroethene	500	U

1F

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GWMW-48-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-2

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-2D2A55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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EPA-CLP METALS

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-48-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix (soil/water): WATER Lab Sample ID: V1201-2

Level (low/med): LOW Date Received: 06/29/00

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	8.8	B		P
7439-92-1	Lead	1.3	B		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-49-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-1

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-1RA55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/05/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-35-4	1,1-Dichloroethene	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
71-55-6	1,1,1-Trichloroethane	10	U
71-43-2	Benzene	10	U
79-01-6	Trichloroethene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U

1F
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GWMW-49-13

Lab Name: COMPUCHEM   Contract:

Lab Code: LIBRTY   Case No.:   SAS No.:   SDG No.: V1201

Matrix: (soil/water) WATER   Lab Sample ID: V1201-1

Sample wt/vol: 5 (g/mL) ML   Lab File ID: V1201-1RA55

Level: (low/med) LOW   Date Received: 06/29/00

% Moisture: not dec. ________   Date Analyzed: 07/05/00

GC Column: EQUITY624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
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EPA-CLP METALS

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-49-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix (soil/water): WATER Lab Sample ID: V1201-1

Level (low/med): LOW Date Received: 06/29/00

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.3	U		P
7439-92-1	Lead	1.3	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

12

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-49-913

Lab Name: COMPUCHEM   Contract:

Lab Code: LIBRTY   Case No.:   SAS No.:   SDG No.: V1201

Matrix: (soil/water) WATER   Lab Sample ID: V1201-4

Sample wt/vol: 5 (g/mL) ML   Lab File ID: V1201-4A55

Level: (low/med) LOW   Date Received: 06/29/00

% Moisture: not dec. ________   Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-35-4	1,1-Dichloroethene	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
71-55-6	1,1,1-Trichloroethane	10	U
71-43-2	Benzene	10	U
79-01-6	Trichloroethene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U

1F
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GWMW-49-913

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-4

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-4A55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
Number TICs found: 0 (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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EPA-CLP METALS

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-49-913

Lab Name: COMPUCHEM Contract: ______

Lab Code: LIBRTY Case No.: ______ SAS No.: ______ SDG No.: V1201

Matrix (soil/water): WATER Lab Sample ID: V1201-4

Level (low/med): LOW Date Received: 06/29/00

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.3	U		P
7439-92-1	Lead	1.3	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture: ______

Color After: YELLOW Clarity After: CLEAR Artifacts: ______

Comments: ______

13

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWFB-01-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-6

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-6B55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/07/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	UG/L	Q
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-35-4	1,1-Dichloroethene	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
71-55-6	1,1,1-Trichloroethane	10	U
71-43-2	Benzene	10	U
79-01-6	Trichloroethene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U

1F
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GWFB-01-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-6

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-6B55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/07/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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EPA-CLP METALS

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWFB-01-13

Lab Name: COMPUCHEM Contract: ______

Lab Code: LIBRTY Case No.: ______ SAS No.: ______ SDG No.: V1201

Matrix (soil/water): WATER Lab Sample ID: V1201-6

Level (low/med): LOW Date Received: 06/29/00

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.3	U		P
7439-92-1	Lead	1.3	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture: ______

Color After: YELLOW Clarity After: CLEAR Artifacts: ______

Comments: ______

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWTB-01-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-7

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-7B55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/07/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-35-4	1,1-Dichloroethene	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
71-55-6	1,1,1-Trichloroethane	10	U
71-43-2	Benzene	10	U
79-01-6	Trichloroethene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U

1F
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GWTB-01-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-7

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-7B55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/07/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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APPENDIX D

VALIDATION NARRATIVE AND LABORATORY REPORTS FROM LOWER AQUIFER

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-09R-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-5

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-5A55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	630	E
75-35-4	1,1-Dichloroethene	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
71-55-6	1,1,1-Trichloroethane	10	U
71-43-2	Benzene	60	
79-01-6	Trichloroethene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U

1F

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GWMW-09R-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-5

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-5A55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 2

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 108-20-3	DIISOPROPYL ETHER	8.92	5	NJ
2.	UNKNOWN	10.97	11	J
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FORM I VOA-TIC OLM04.2

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-09R-13DL

Lab Name: COMPUCHEM   Contract:

Lab Code: LIBRTY   Case No.:   SAS No.:   SDG No.: V1201

Matrix: (soil/water) WATER   Lab Sample ID: V1201-5

Sample wt/vol: 5 (g/mL) ML   Lab File ID: V1201-5DA55

Level: (low/med) LOW   Date Received: 06/29/00

% Moisture: not dec. ________   Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm)   Dilution Factor: 5.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-01-4	Vinyl Chloride	50	U
75-00-3	Chloroethane	660	D
75-35-4	1,1-Dichloroethene	50	U
156-60-5	trans-1,2-Dichloroethene	50	U
156-59-2	cis-1,2-Dichloroethene	50	U
71-55-6	1,1,1-Trichloroethane	50	U
71-43-2	Benzene	53	D
79-01-6	Trichloroethene	50	U
79-00-5	1,1,2-Trichloroethane	50	U
127-18-4	Tetrachloroethene	50	U

1F
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GWMW-09R-13DL

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-5

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-5DA55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 5.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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FORM I VOA-TIC OLM04.2

EPA-CLP METALS

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-09R-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix (soil/water): WATER Lab Sample ID: V1201-5

Level (low/med): LOW Date Received: 06/29/00

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	2.4	B		P
7439-92-1	Lead	1.3	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

10

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GWMW-10C-13

Lab Name: COMPUCHEM Contract:

Lab Code: LIBRTY Case No.: SAS No.: SDG No.: V1201

Matrix: (soil/water) WATER Lab Sample ID: V1201-3

Sample wt/vol: 5 (g/mL) ML Lab File ID: V1201-3RA55

Level: (low/med) LOW Date Received: 06/29/00

% Moisture: not dec. ________ Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	160	
75-35-4	1,1-Dichloroethene	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
71-55-6	1,1,1-Trichloroethane	10	U
71-43-2	Benzene	150	
79-01-6	Trichloroethene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U

1F
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

GWMW-10C-13

Lab Name: COMPUCHEM   Contract:

Lab Code: LIBRTY   Case No.:   SAS No.:   SDG No.: V1201

Matrix: (soil/water) WATER   Lab Sample ID: V1201-3

Sample wt/vol: 5 (g/mL) ML   Lab File ID: V1201-3RA55

Level: (low/med) LOW   Date Received: 06/29/00

% Moisture: not dec. ________   Date Analyzed: 07/06/00

GC Column: EQUITY624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: _____(uL)

Number TICs found: 2   CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	6.54	2100	J
2. 123-91-1	1,4-DIOXANE	11.91	5	NJ
3.				
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